Pipeline and Hazardous Materials Safety Administration

Office of Pipeline Safety

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Construction & Material Quality Issues

- **Coating Issues**
- **Pipe – cutting of hot bends**
- **Pipe - wall thickness transitions and ovality**
- **Pipe & Fitting Strength – low and variable strength**
- **Welding – repairs, alignment & procedures**
- **Parallel construction**

Construction Issues

- **Coating Issues**

Construction Issues

Coating – due to pipe support

Construction Issues - Jeeping Over Soil

Coating - improper patch stick application

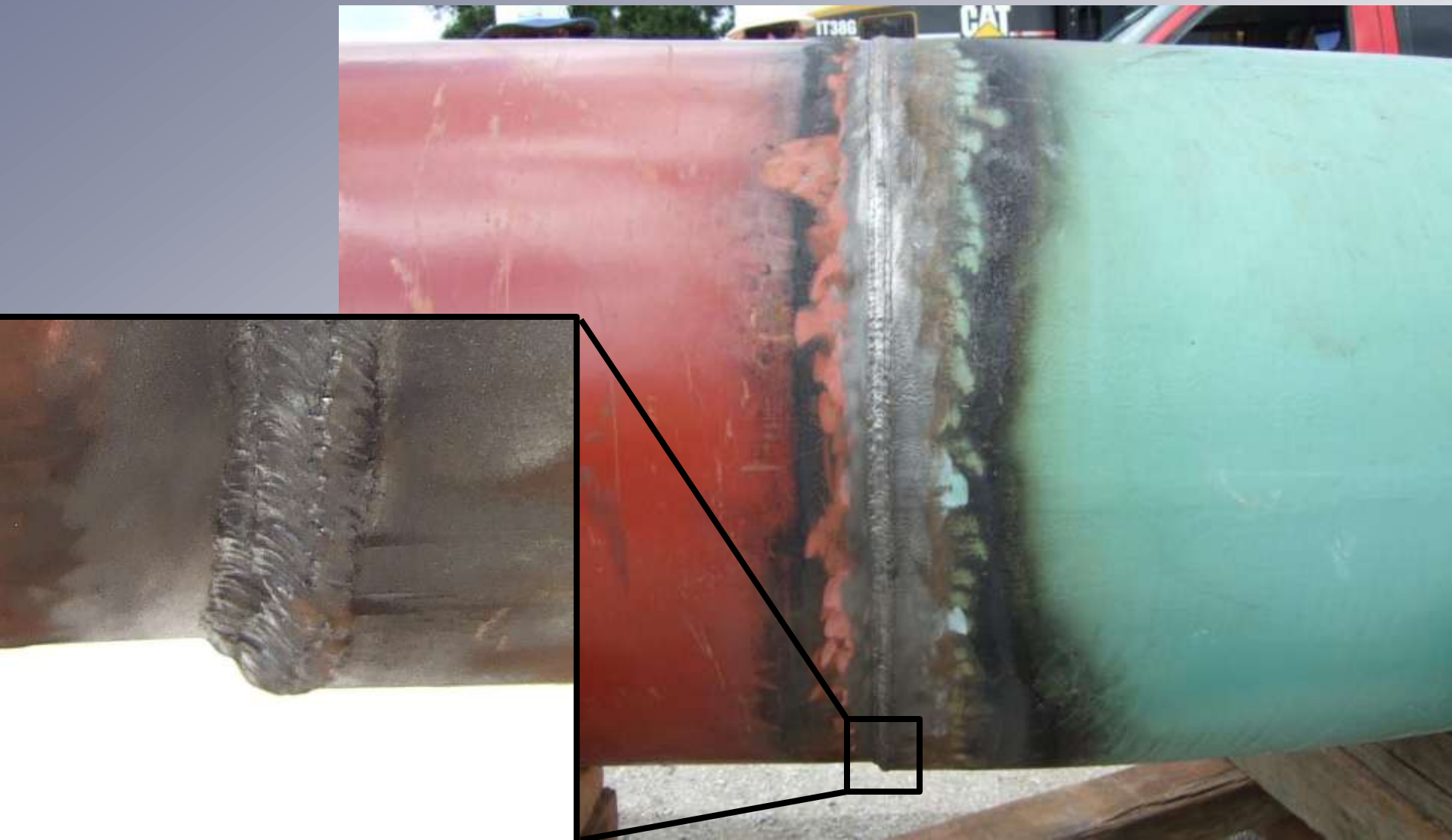
Coating – poor application of FBE

Coating – damaged by welding band

Coating – poor factory application

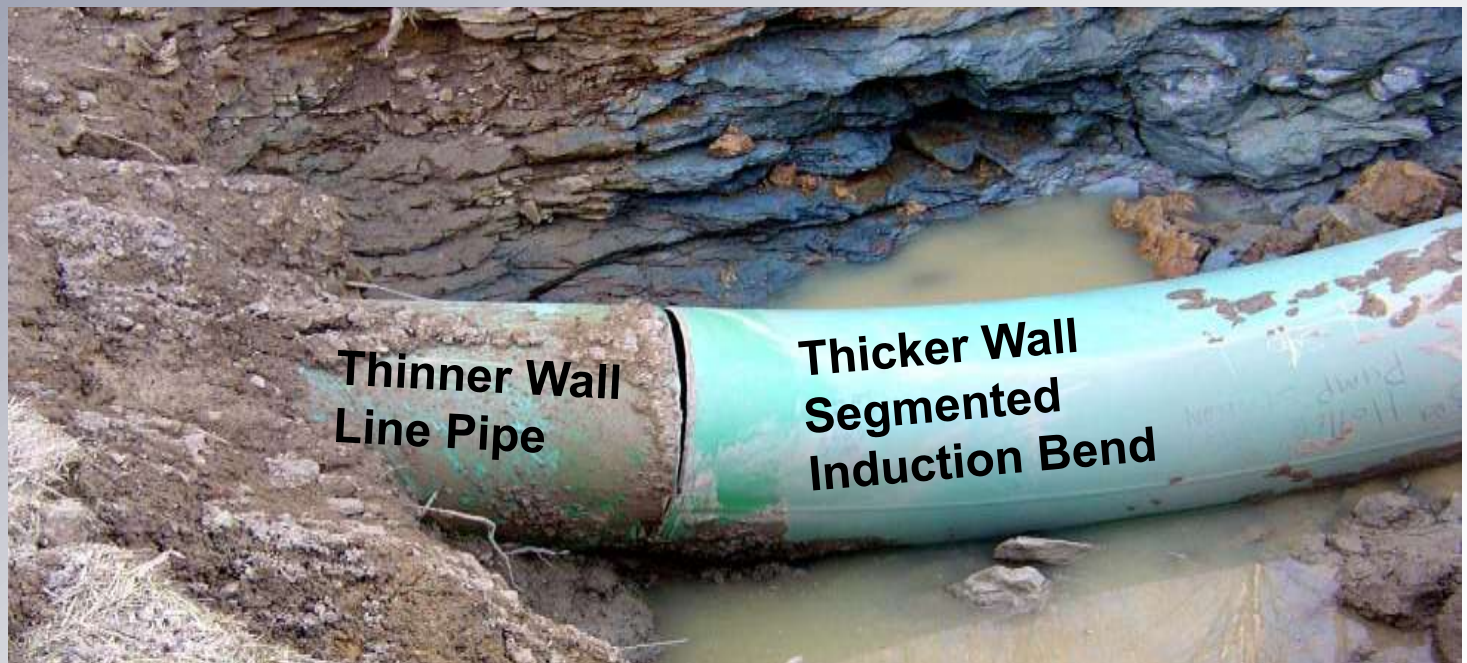
- **199 jeeps on section**

Misalignment at Segmented Bend



ADB-10-03 Girth Weld Quality Issues

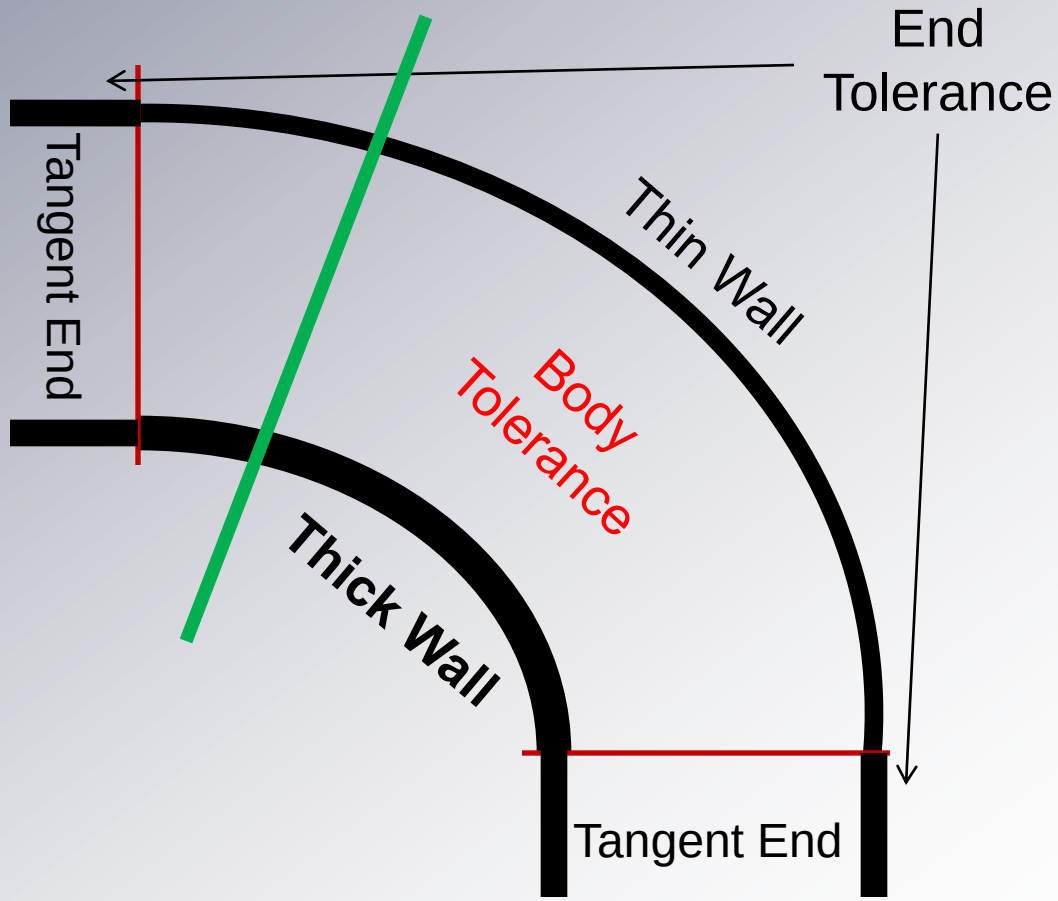
- Misalignment, thickness transitions, and welding practices
- Below in-service failure occurred at 65% SMYS



Bends & Fittings

Bend fittings
Hot induction bends

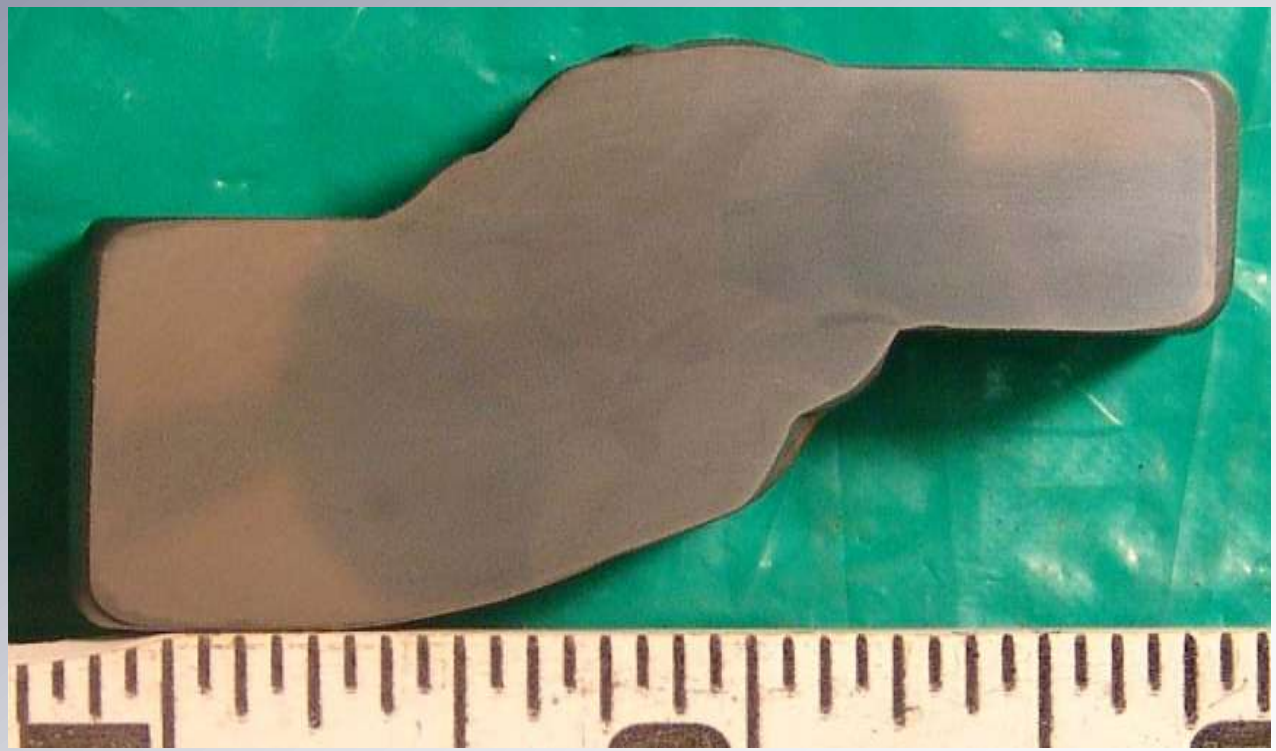
- If cutting bends, use **segmentable** bends with tighter body tolerance
- Ends should meet:
  - API 5L dimensional limits
  - API 1104 fit-up requirements



Hot induction bend cross-section

Construction Issues – weld alignment

- **Alignment – does it meet standards for API 1104**

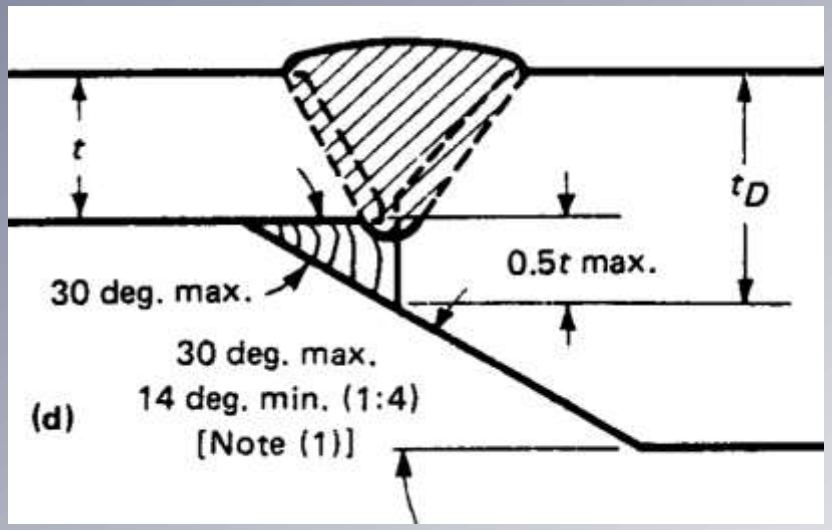


Construction Issues – weld alignment

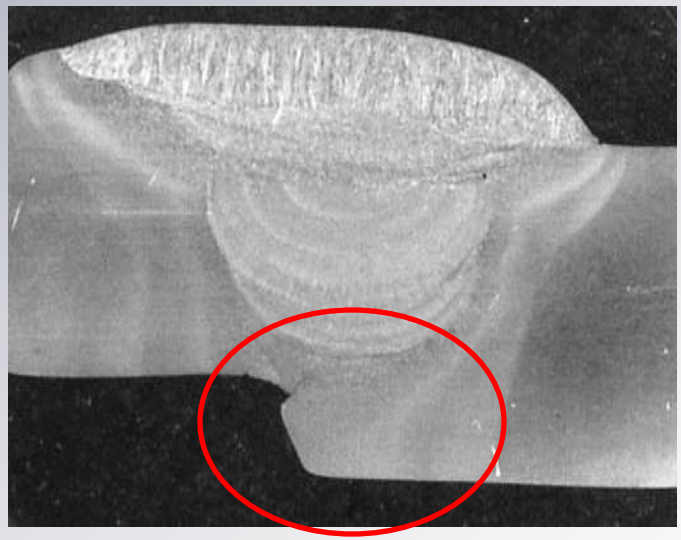
- **Poor back welding & misalignment**

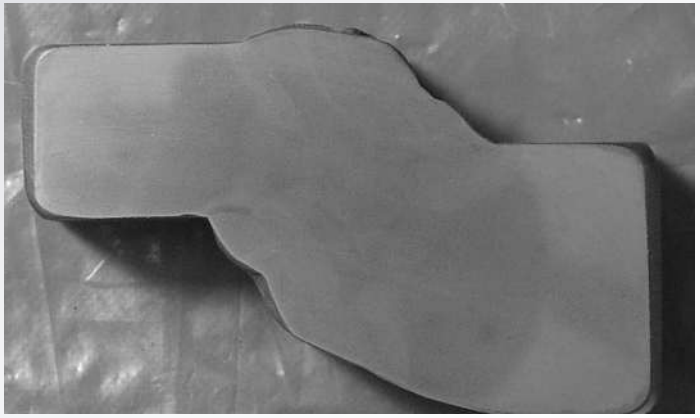
- **Improper ID back taper angle**

Improper Weld Transitions



ASME B31.8 Fig. I-5





Pipe Quality Issues

- Low strength X70 & X80
- Inconsistent chemical and mechanical properties
- Poor mill rolling practices
- Advisory Bulletin - ADB 09-01

Construction Issues – low strength pipe

- **Low Strength Pipe**

Construction Issues – low strength fittings

- **Several major projects have installed fittings of low strength material –**
  - **due to incorrect grade material and/or**
  - **post heat treatment**

Construction Issues – low strength fittings

- **Coating is cracking due to expansion of fitting during testing**

Construction Issues - Low Strength Fittings

Hydrotest failure at 80% of test pressure

Construction Issues – welding

- **Inadequate preheat temperature**

Construction Issues – welding

- **Releasing external clamp before 50% root pass is completed**

Construction Issues – welding

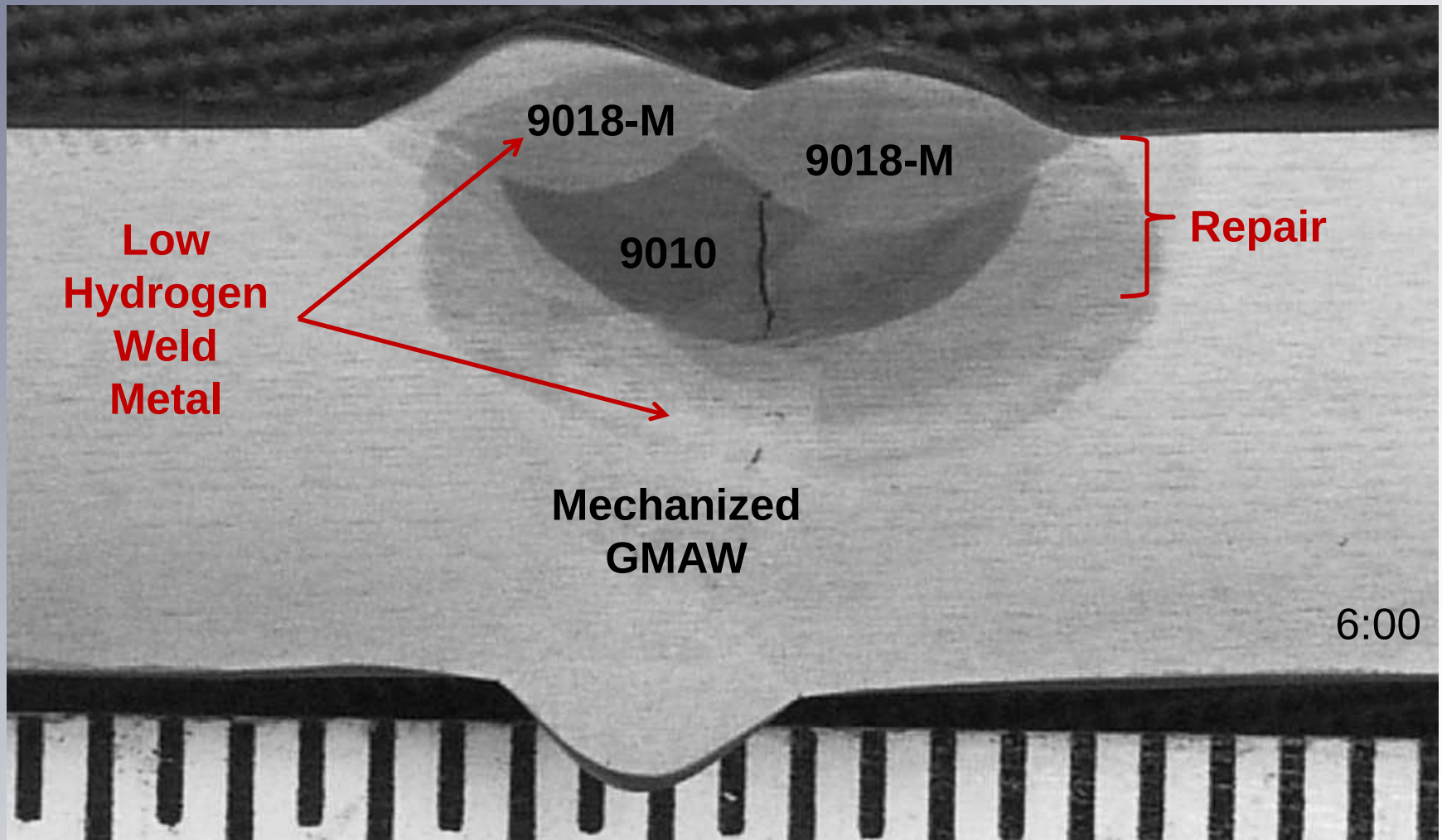
- **Improper low-hydrogen stick electrode storage**

Construction Issues – weld gap

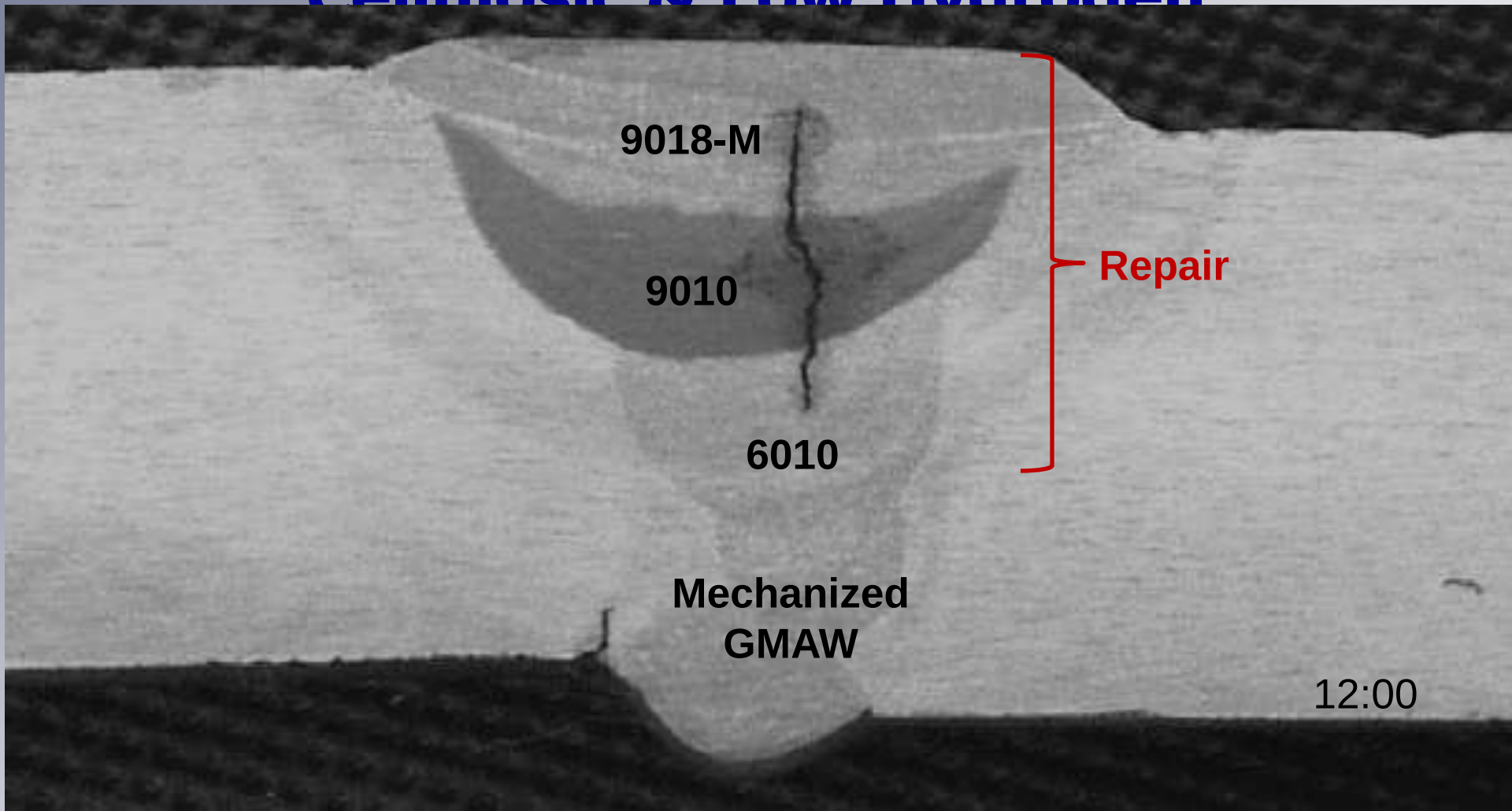
- **Improper Weld Gap**

Hydrogen Cracking

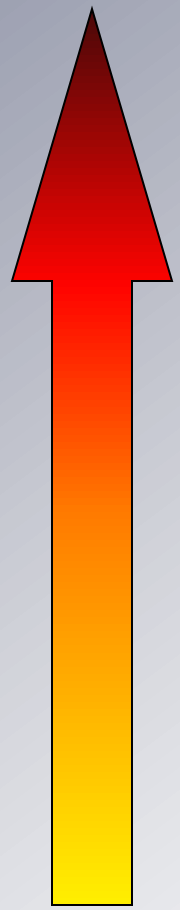
Partial Thickness Repair: Only 1 Cellulosic Weld Pass



Partial Thickness Repair: Cellulosic & Low Hydrogen



Hydrogen Cracking Risk by Electrode Type



Increasing Risk

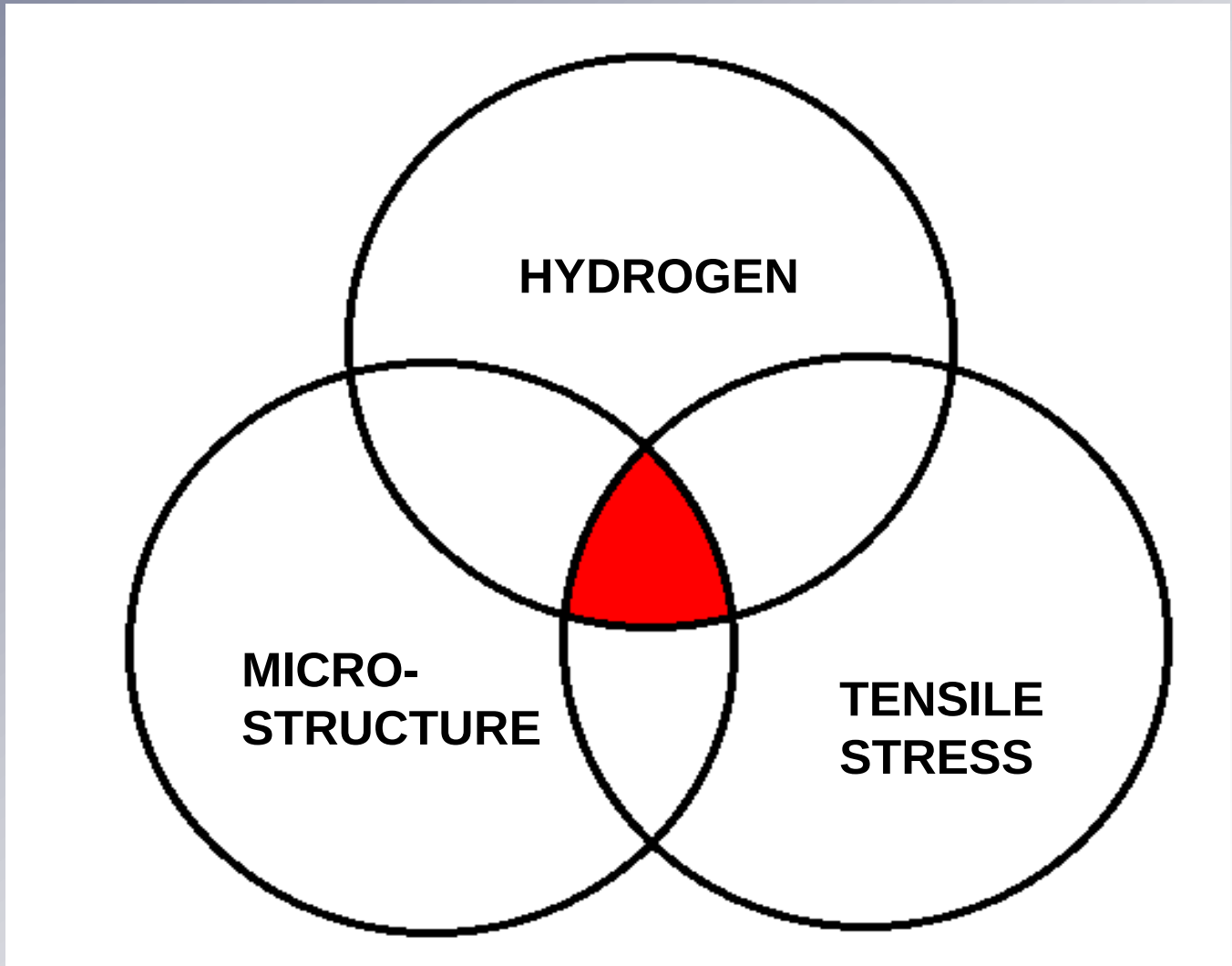
- E9010
- E8010
- E7010
- E6010

} Cellulosic

- FCAW (flux-cored)
- E9018
- E8018
- E7018
- GMAW (MIG)

} Low Hydrogen

Hydrogen Cracking



Construction Issues – cracked girth weld

Recent Girth Weld Incidents

Welding Issues in Alaska

- Continuity records of the welder from the time he was tested to today
- Supports welded to piping on a DOT liquid pipeline
- Arc burn not being ground out and tested
- Low hydrogen rod not maintained per manufacturer's specifications
- Welder not welding to Pipeline operators welding procedure
- No visual inspection of welding
- No welding procedure for the material being welded

NDT issues

- Failed to meet minimum NDT requirements of 192/195
- Weld maps do not correlate to Radiographic records
- Poor radiograph technique
- Poor inspection
- NDT to ASME B31.3, not to API 1104

Construction Issues – NDE Quality

- **Poor radiographic quality**

Construction Issues

- **2nd /3rd Party Damage to Adjacent Pipeline**

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